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ABSTRACT

This study investigated whether the presence or absence of selected characteristics of the cognitive apprenticeship model of instruction influenced changes or lack of change in the performance of two interns over time. One internship site reflected the characteristics of the cognitive apprenticeship model, and the other did not. The interns were chosen based on similarities in gender, social skills, English language skills, level of educational media education, and previous internship experience. Each intern was observed in the field for 8 hours a week during the 3 month internship, and interviews were conducted with the intern, her mentors, and the staff. Identifying patterns that emerged over time in each setting and similarities and differences in change or lack of change in performance helped specify the conditions under which change occurred. A comparative case analysis helped illuminate the usefulness of the cognitive apprenticeship model in understanding the internship experiences. Two clear conclusions emerged. The presence or absence of the selected characteristics of the model (modeling, coaching, scaffolding and fading, and articulation) critically contributed to the development or lack of development of expertise. Also, although the model was useful for understanding what happened, other factors also needed to be considered systematically. (Contains 72 references.) (SLD)

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by

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The Effects of Internship on the Development of Expertise Among Graduate Students in the Field of Educational Technology

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Abstract

Internship is a vital educational experience to help prepare students for their future careers. However, given the dramatic changes in the workplace, more extensive research is needed that examines students' internship experiences. The cognitive apprenticeship model of instruction focuses primarily on the development of expert skills during participation in a culture of expert practice. This study highlights whether the presence or absence of selected characteristics of this instructional model influenced changes or lack of change in two interns' performances over time.

Qualitative research design guided the formulation of research questions, data collection, and analysis procedures. To provide a detailed, in-depth longitudinal description of the interns' experiences, only two interns were selected as participants, each at a different site -- one site reflecting characteristics of the cognitive apprenticeship model, the other not. Interns were chosen based on similarities in gender, social skills, English language skills, level of educational media education, and previous internship experience.

To uncover conditions of the two internship experiences that positively or negatively affected performance development, each intern was observed in the field for eight hours a week during their three-month internship, and interviews were conducted with the intern, her mentors and the staff. Interns' written mid-term and final reports were also analyzed. The data were examined using a code set for the criteria of expert performance in the major tasks of each internship that was created from a task analysis of the field log. The data units in each category were explored for the presence or absence of selected characteristics of the cognitive apprenticeship instruction model. Identifying patterns that emerged over time in each setting and similarities and differences in change or lack of change in performance helped specify the conditions under which change occurred. A comparative case analysis helped further illuminate the usefulness of the cognitive apprenticeship model in understanding the interns' internship experiences, particularly their levels of performance by the end of their internships.

Two clear conclusions emerged: First, the presence or absence of the selected characteristics of the cognitive apprenticeship model of instruction -- modeling, coaching, scaffolding and fading, and articulation – critically contributed to development or lack of development of expertise. Second, although the model was useful for understanding what happened, other factors also needed to be systematically considered: A high level of the intern's prior knowledge and experience and of intern personal agency, as well as a situated learning experience, positively affected the development of performance; moreover, constraints in the workplace seemed to negatively affect performance development.

The Effects of Internship on the Development of Expertise Among Graduate Students in the Field of Educational Technology

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Rationale and Background

Professional organizations in the US have embarked on a major rethinking of the concepts of work, the worker, and workforce skills, according to case studies of industries (Bailey, 1992; Jones, Womack, & Roos, 1990), ethnographic studies of work (Darrah, 1990; Lave & Rogoff, 1984; Lave and Wenger, 1991), and analyses of changes in skills vital in the workplace (Berryman & Bailey, 1992). Rigid hierarchical production methods and management systems, requiring very specific and limited skills that give workers little authority and offer them few opportunities to participate in production in the larger sense are becoming outmoded (Osterman, 1994). Taking their place are more flexible arrangements, flattened hierarchies in which workers in diverse areas are required to perform a wider variety of tasks, to work in teams, and to take greater responsibility (Applebaum & Batt, 1993).

The jobs and workplace experience of educational media and other professionals are being viewed to be complex interactions among the skills and talents of groups of workers and between workers and the goals and missions of their larger work environments (Christ & Blanchard, 1993). Higher performance levels are necessary, including the ability to work independently, to articulate one's own work with the work of others, and to work in teams, all of which involve critical thinking, problem-solving, and decision-making. (Ciofalo, 1992). A US Department of Labor and American Society for Training and Development report (as cited in Carnevale and Gainer, 1989) described the skills employers want as the three R's (reading, writing, arithmetic), learning to learn skills, listening and oral communication, creative thinking and problem-solving, and teamwork. Dependence on the expertise of employees interacting in small working units continues to increase (US Congress, Office of Technology Assessment, 1990; Berryman & Bailey, 1992). Expert performance in the workplace now requires that employees be able to work together, focus on common goals, and solve problems in teams (Best, 1990; Hull 1997). Students graduating from college who are seeking positions in educational

media, including instructional designers, media instructors, writers, producers, and technicians, must possess these new workforce skills that characterize expertise.

Resnick (1996), Lave, and Wenger (1991) and the Secretary's Commission on Achieving Necessary Skills, US Department of Labor (1991, 1992, 1993) have noted differences between skills learned in school and skills needed in the workplace. The dominant focus of school learning has been perceived as individual performance to standards rather than independent thought, collaboration, and socially shared activity characteristic of and required within the contemporary workplace. Traditional educational practices tend to emphasize the instructor's authority and reduce the learner's need and ability to actively participate, whereas a professional is required to participate in a community of practice (Orr, 1990a). Furthermore, traditional practices can constrain student questioning, resulting in a student's fear of asking questions (Schonfield, Eurich-Fulcer, & Britt, 1994), even though curiosity and inquiry are central to expert performance as either an independent or collaborative endeavor. Similarly, "The ability to interpret unfamiliar text, create material others would want to read, construct convincing arguments, develop original solutions to technical or social problems were not skills emphasized in school education" (Resnick, 1987, p. 5).

In the traditional college classroom, individuals think and behave differently than they do in the workplace because participants within each setting operate within their own distinct cultural framework (Lave, 1988). In school, conventional teaching methods that aim toward fact-based and right-answer learning strive to impart "abstracted conceptual tools as fixed, well-defined, independent entities that can be explored in prototypical examples and text exercises" (Brown, Collins, & Duguid, 1989, p.33). However, although domain knowledge is important in the education of professionals, if taught in isolation, it fails to provide procedural clues for students to know how to carry out tasks within the workplace (McLellan, 1996; Whitehead, 1929). As Brown, Collins, and Duguid state,

> Students need to be exposed to practitioners using tools in the authentic, ill-defined problems of their world. It is from this sort of activity that the culture's belief system - - the key to understanding its behavior - - can be inferred and adopted. (p. 34)

Resnick and Wirt (1996) stress that students must be taught these relevant skills within a context that closely resembles the character of the workplace in which such skills will be required in performance. Often, however, students do not have an opportunity to gain the skills

necessary and relevant to productive professional practices because current approaches to classroom instruction fail to focus on the development of expertise in the realistic, authentic contexts in which the skills of this performance will be applied (Bishop, 1988; Collins, Brown, & Newman, 1989; Lave, 1988).

To establish a national framework for the development of school-to-work opportunities systems in all states, Congress passed the School-to-Work Opportunities Act of 1994. Modeled on the German apprenticeship system, this legislation includes both school-based and work-based components, such as internships in the professional field. In this spirit, new educational reform efforts are reconsidering and reevaluating several principles central to the traditional apprenticeship. For example, experts work alongside novices in authentic contexts to show and explain what is expected (Farnham-Diggory, 1990).

Cognitive scientists continue to bring new insights from learning theory to the traditional model. The emergent strategy, "cognitive apprenticeship" (Brown, Collins, & Duguid, 1989), is prominent among a number of educational approaches that have evolved to foster the development of expert performance in realistic contexts, including situated learning and anchored instruction (CTGV, 1990), The Community of Learners (Brown & Campione, 1994), and Computer-Supported Learning Environments (Scardamalia, Bereiter, & Lamon 1992). Lebow (1995) claims that within these instructional approaches, students have access to and support of models of expertise-in-use, observing professional teams in action, listening to the independent and collaborative thinking behind the action, and gradually becoming active team participants with increasing responsibility. By observing expert practice and the thinking behind it, students actively participate in a learning experience that closely approximates or resembles the workplace. Internships are a conventional and contemporary framework for cognitive apprenticeships. Learning in an educational media internship may be said to be situated in a community of practice, in which the criteria for expert performance are evident in the day-to-day interactions of technical specialists and educational content providers working within teams.

In light of changes in the workplace, more research is needed to describe the educational experiences of students during their internships, a vital part of preparing students for the world of work. The research strongly suggests that the development of skills necessary for expert performance is essential to students' professional education (Carnevale, Gainer, & Meltzer, 1990; National Alliance for Business, 1987). Zugga (1994), in a review of the literature from

1987-1993 in the technology education field, noted that more information about how novices become professionals would be useful. The current study primarily focused on the effective cultivation of expertise among students preparing to enter the educational media profession, specifically to highlight how, if at all, the presence or absence of selected characteristics of the cognitive apprenticeship model of instruction influenced changes or lack of change in two interns' performances over time.

Theoretical Framework

Situated learning is based upon the notion that knowledge is contextually situated and is fundamentally influenced by the activity context and culture in which it is used. Studies have shown shortcomings in learning within the school context, as compared to learning in the culture of expertise and professional practice. Research shows that the nature of the learning context, or setting, critically influences the development of expert performance (Evanciew, 1994; Lave & Wenger, 1991; Millroy, 1992) and suggests that characteristics of the cognitive apprenticeship model of instruction may positively affect expertise development. Millroy (1992) found a positive relationship between the apprentices' participation with coworkers engaged in authentic projects and the development of professional practices. Evanciew (1994) found that cognitive apprenticeship instruction methods helped students gain valuable experience in identifying the magnitude and extent of problems, thereby improving their performance. Cordeiro and Smith-Sloan (1995) discerned that an effective apprenticeship includes an opportunity for articulation and reflection and the sequencing of increasing complexity and diversity of the apprentices' tasks.

In the context of communities of professional practice, studies conducted by Scribner and Sachs (1990), Hull, Schultz, Jury, and Ziv (1994), and Lave (1997) indicate that the characteristics of authentic settings provide opportunities for developing expertise. However, although enthusiasm for work-based apprenticeship exists, few recent studies describe the characteristics of cognitive apprenticeship learning in the context of the workplace. Without sufficient research, cognitive apprenticeship advocates will continue to be criticized for misguided over-generalizations of both the limiting effects of "traditional" instruction and the robustness of situated learning (Anderson, Reder, & Simon, 1996).

Yet various studies support and elaborate on instructional methods and characteristics essential to the development of expertise, including exposure to a broad range of complex problems, declarative and procedural knowledge, and experience with individual and group problem-solving. Exploring influences of expert modeling and coaching on raising students' reading comprehension scores, Palincsar and Brown (1984) claimed that the success of the instructional method depends on expert modeling to engage students in activities that help them form a conceptual model of the task, on students' articulation and reflection on their own performance and on expert performance in the situated learning context, and on scaffolding and fading techniques that support the student, as needed, in carrying out the task at hand.

In their approach to teaching writing, Scardamalia and Bereiter (1985) incorporated characteristics of cognitive apprenticeship -- specifically, modeling expert processes -- followed by a gradual reduction of scaffolding. Their findings indicate that scaffolding and fading helped students to keep track of expert thinking and appropriate timing and to effectively apply strategies for expert performance. Through their studies of anchored instruction, the Cognition and Technology Group (1990, 1992) found that the learning context and the process of learning to solve realistic problems can facilitate students' performance development. Johnson, Fishback, and McDonough (1992) found that a cognitive apprenticeship instruction method is plausible and as effective as the traditional method; however, to be effective, the model not only requires careful planning, extensive teacher training, and considerable effort, but it also needs to be refined.

In their day-to-day professional practices, educational media professionals must deal with a broad range of complex tasks. They must identify and address problems associated with administration, personnel management, technical coordination, and resource allocation. For example, working within the limits of emerging technology, a professional creating a web site must employ declarative and procedural knowledge to meet the client's educational goals. This requires identifying user access, developing html programming solutions, testing solutions, and evaluating results. Throughout this process, the media professional must present the client with pertinent information in order to share in the decision-making process and achieve a high level of performance.

The cognitive apprenticeship model of instruction is concerned primarily with the development of expert skills during participation in a culture of expert practice. According to

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Collins (1985), in the ideal cognitive apprenticeship, apprentices learn through the interplay of modeling, coaching, and articulation, among other factors. Empirical research supports Collins' theory (Lampert, 1986; Lave & Wenger, 1991 and Resnick, 1987), and several researchers' findings on the development of expertise also helped shape this study (Greeno, 1998; Carnevale, et al., 1990; Schonfeld, 1985).

This study was an attempt to illuminate further the characteristics of the cognitive apprenticeship model that affect the development of expertise. I describe in detail two internship experiences, including the interns' major activities and experience with instruction methods, as well as the change or lack of change in their performance over time.

Research Methods

Qualitative research design guided the formulation of research questions, data collection, and analysis procedures. To provide a detailed, in-depth description of the interns' experiences over time, only two interns (Dawn and Eve) were selected as intern subjects. I attempted to find interns of the same gender who had similar social skills, English language skills, level of educational media education, and previous internship experience; I reasoned that the more similar the subjects, the more likely that any differences in internship outcomes would be due to features of the setting rather than to the interns themselves. On the other hand, I selected two sites with different characteristics: One setting was selected on the basis of the reflecting characteristics of the cognitive apprenticeship model, having the potential to shape the intern's experience; the other setting lacked such characteristics. Dawn was the intern at the first site and Eve was the intern at the second site.

The methods of case-study research (Yin, 1994) were most appropriate for my research objectives -- to describe in detail the internship experience as the basis for understanding and interpreting it from the perspective of the cognitive apprenticeship model of instruction. I was concerned with the day-to-day events, as well as the unusual events, that the interns experienced. Such an approach enabled me to enter the setting and be close to each intern and her perspective mentors and co-workers for the entire duration of the internship. Direct, prolonged contact with individuals in each setting helped me discover the patterns that influenced and affected each intern's performance. I was directly involved in their community life, observing and talking with the participants as I learned their views of the internship experience. An in-depth examination of

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the similarities and differences between the two interns' experiences helped illuminate further the usefulness of the cognitive apprenticeship model in understanding the change or lack of change in development of expertise.

Data Sources

Observations of, conversations with, and interviews with interns, site supervisors, and staff provided the three main data sources for examining how significant influences of the internship experience affected the interns' development. Each intern was observed in the field for eight hours a week during the internship. In addition, the interns' mid and final written reports were also a major data source. Data were entered into a log that became the basis of my analysis. The fieldwork began in February 1999 and ended in May 1999.

My descriptive field notes and reflective personal notes based on my observations were rich sources of data to help me describe and understand the interns' day-to-day experiences. I also wrote analytic memos about my ideas for further inquiry (Ely, 1991). In the informal phase of the funnel approach (Agar 1996), my observations provided topics for discussion with participants. In the formal phase, they were a way to test out what I thought I had learned.

I exercised a number of options to engage the interns in discourse, ranging from casual conversations over coffee to semi-structured interviews to formal interviews. I recorded conversations as fully as possible from my handwritten field notes. With the interns' permission, I audio-taped semi-structured interviews, which illuminated their feelings about their experiences in the field and their reflections on these experiences. From these interviews, I also gained information about their social and cultural backgrounds, educational media experiences, attitudes and beliefs about the training of professionals, and their ideas on expertise in the educational media field. I also audio-taped their structured interviews, which contained open-ended questions generated by analysis of my prior field observations.

In addition, I spoke with the interns' supervisors and co-workers regarding the goals and intentions they had for their respective interns, their actions taken during this period related to the internship, and their perceptions of any changes they observed in the interns. When participants (interns, supervisors, and co-workers) began to provide an account of some event, I used the general framework of who, what, when, where, why, and how questions to obtain more details. I also used specific question-forming strategies to obtain details, to learn about

connections with other kinds of accounts, and to attempt to prove myself wrong in what I thought I had learned. A basic goal was to learn how participants experienced the internship at the setting by attending to how they talked about it.

The field log included my analytic notes/memos, method notes, personal notes, and field notes, typed from my handwritten notes taken during my observations, casual conversations, and semi-formal and formal interviews. The final log totaled approximately 1,000 pages. Pages were numbered sequentially and lines on each page were numbered from 1 to 50. the log was descriptive, reflective, and analytic. The descriptive part of the log contained portraits of the subjects, reconstructions of dialogue, descriptions of the physical settings, accounts of particular events and depictions of activities. The reflective part of the log contained my speculations, feelings, problems, ideas, and prejudices, written in personal notes/memos or in the body of the typed descriptive observation notes.

Analysis of the Data

Methods used to analyze the data and to draw conclusions were guided by data analysis techniques outlined in Agar (1980), Bogdan and Biklen (1992), and Miles and Huberman (1994). Analysis was conducted to answer six main research questions.

Question 1: "What was the nature of each intern's experience, with a focus on the activities that take place and how she reacted to them?" My initial goal was to conduct observations and interviews in the internship settings to help provide me with accounts and to subsequently begin to examine the types of professional practices that occurred in these contexts. I read my observation notes and transcripts, marking off segments that cohered because they focused on similar practices. Recurrent topics were prime candidates for coding categories. In my efforts to categorize data, I created a code set based on a coding scheme outlined by Bogdan and Biklen (1992). This included codes for context, social structure, events, activities, strategies, and subjects' beliefs and opinions.

Question 2: "How can each intern's performance be described, especially with regard to the criteria of expert performance?" During my observations of and conversations with the interns, I paid particular attention to their level of participation in the professional practice within each setting.

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Question 3: "What significant changes or lack of change occurred in each intern's performance, especially with regard to the major tasks of their respective internship?" In conducting task analysis of my observation notes and interview transcripts, I created a set of codes for the criteria of expert performance in each internship's major tasks. The task analysis process provided a means to compare the criteria for expert performance with the interns' actual levels of performance, which helped to highlight the change or lack of change in performance over time.

Question 4: "Was there evidence that the changes or lack of change in each intern's performance was influenced by selected characteristics of the cognitive apprenticeship model? If so, how were these characteristics influential?" I created a set of codes based on selected characteristics of the cognitive apprenticeship model of instruction. I used codes for descriptions of modeling, coaching, scaffolding and fading, and articulation. I examined the data and marked each data unit with the appropriate coding category abbreviations. I also coded some of the data units for more than one category.

I used a series of tactics outlined by Miles and Huberman (1994) to further analyze the data, exploring the data units in each coding category to see what patterns emerged. To identify significant themes in the data, I noted the frequency of occurrence of each code and the context in which the code was present or absent. Identifying patterns in the presence or absence of selected characteristics of the cognitive apprenticeship model of instruction in the two settings and similarities and differences in the change or lack of change in each intern's performance helped me to specify the conditions under which change occurred.

Question 5: "What additional factors influenced the changes or lack of change in each intern's performance over time?" It was important to note which factors other than the selected characteristics of the cognitive apprenticeship model influenced change or lack of change in each intern's performance.

Question 6: "How do similarities and differences between case studies of two interns help to illuminate the usefulness of the cognitive apprenticeship model in understanding the internship experiences?" I conducted a comparative case analysis of the significant patterns in both cases, applying the same methods used within each case analysis to this across-case analysis.

Miles and Huberman (1994) describe a series of tactics that aim at ensuring research credibility. They emphasize the importance of the basic quality of the data and suggest checking

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the findings by examining exceptions to early patterns and skeptically examining emerging explanations. I used these tactics in an attempt to challenge what I thought I knew.

I also checked for representativeness when moving from particulars to generalities. By employing a variety of data collection procedures, I was able to triangulate across data sources and methods. For example, I observed that Eve had limited models for collaborating in grant-application preparation, and I also read Eve's reflections on the absence of role models for this task in her mid-term and final papers.

During and after the fieldwork phase, I requested feedback from my subjects, essentially member checking. Whenever possible, I cross-checked my data to improve confidence in the quality and to strengthen the significance of the findings. For example, during an interview with Eve, I said, "I heard you say, or did you say the other day, that you have no experience with a web based application called Dreamweaver?" Her replying that this was correct confirmed that what I had heard was, indeed, what she had said. When I asked her if she felt confident in her ability to identify appropriate software for a web production curriculum, she replied that she did not, verifying my conclusion that her limited experience with web production applications limited her ability to identify appropriate software for a web production curriculum.

To strengthen the study's internal credibility and authenticity, I wrote analytic memos that addressed such questions as the following: Do the findings make sense? For purposes of validity, have I used multiple sources of evidence and established a chain of evidence? Does it measure what I think it does? Do the patterns coincide within and across the two cases? Are they credible to the subjects and potential readers? Have I included rival interpretations in the analysis? The series of method notes that I created provided a clear audit trail against which to measure the strength of the findings.

Results

Changes in Dawn's and Eve's performances were due, in part, to the influence of intentional and unintentional modeling. Jake's demonstrations and verbal explanations provided Dawn with a conceptual road map by explicitly identifying the details of expert performance. His think-aloud modeling helped her become more cognizant of typically invisible processes. Similarly, Jake's and Carl's day-to-day activities (unintentional modeling) facilitated Dawn's performance development.

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Eve's performance in collaborating to create the video production curriculum manual reflected only a slight change, partially due to her not having an opportunity to observe collaboration models between the directors themselves. However, because Eve listened to the directors' and consultants problem-solving process when they met to develop the web project, her ability to identify the necessary skills for assessing the magnitude or extent of a problem in this context changed slightly.

Both Dawn and Eve had few opportunities to learn from modeling as their mentors, respectively, taught switcher operations during rehearsals and prepared grant applications. The lack of opportunity to learn from observing expert models had a negative influence that contributed to a lack of change in the interns' performances in these areas.

Coaching, when appropriately provided through scaffolding and fading, positively influenced the interns' development of expertise. However, for the most part, a lack of coaching -- providing prompts or cues -- negatively influenced both interns' abilities to develop while practicing expert strategies of performance.

When Jake and Carl encouraged Dawn to practice under their supervision, their scaffolding helped her to recall and apply the expert strategies that she had observed. However, the directors usually did not provide Eve with sufficient coaching to engage her beyond peripheral participation while creating the video production curriculum manual. Because coaching was often irregular and inconsistent, Eve's experience with scaffolding and fading in this context contributed to only a small improvement in her performance. Yet the consultants attempted to coach her by scaffolding her collaboration, prompting her to elaborate and impose coherence on the strategies and thinking dispositions needed for expert performance. Subsequently, Eve demonstrated a small improvement in her ability to collaborate when she addressed similar and new problem situations.

Similarly, because Jake and Carl completely withheld support when Dawn attempted to teach switcher operations during rehearsals, no change in her performance in this context was evident. Similarly, the directors' absence did not permit them to facilitate Eve in collaborating to prepare grant applications. On the few occasions when they did attempt to include her, even at a minor level, Eve demonstrated an inability or unwillingness to participate or to take on much responsibility.

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The presence of intern articulation positively influenced the development of expertise. For example, when Jake and Carl encouraged Dawn to share her perceptions about her observations, she articulated an emerging understanding of patterns and noted novel strategies. As time progressed, her ability to articulate and reflect on what she had seen led to improved performance. Similarly, Eve's coworkers, Allistar and Mason, somewhat facilitated her ability to collaborate by providing minor coaching to scaffold her verbalizations. Their cues prompting her to summarize, explain, and reflect facilitated her interactions during collaborations. However, overall, Eve's ability to collaborate and share responsibility for the web project showed only modest improvement. In both cases, the lack of encouragement to demonstrate, self-consciously, thinking processes in teaching switcher operations (Dawn) and preparing grant applications (Eve) contributed to the interns' lack of change in their abilities to understand and apply expert thinking in these performance areas.

In each case, the presence of the significant characteristics -- modeling, coaching, scaffolding and fading, and articulation -- positively influenced performance. However, the inter-relatedness and interdependence of each characteristic of the model should be highlighted. Often, the influence of one characteristic was dependent on not only the presence but also the consistency and nature of the other characteristics. For example, when the directors and consultants met together to develop the web project, they provided Eve with think-aloud models of expert performance; however, the group provided Eve with irregular and inconsistent coaching, failing to support her in applying the expert strategies that she had observed them model. In this context, Eve demonstrated only a slight performance change.

The comparative analysis of the two case studies also confirmed the influences of additional factors on the interns' performances. The influence of a high level of prior knowledge and experience on the ability of the intern to develop expertise was indicated in both cases. However, Eve's low level of immersion in the community of expert practice limited the impact of this factor on her performance. In addition, time constraints and heavy workload resulted in the interns' limited opportunities for new or broad learning that might lead to improved performance.

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Conclusions and Recommendations

Two clear conclusions emerged from these findings. First, the presence or absence of the selected characteristics of the cognitive apprenticeship model of instruction critically contributed to the development or lack of development of expertise. Second, although the model was quite useful for understanding what occurred, other factors also needed to be systematically considered. A high level of intern prior knowledge and experience, a situated learning experience, and a high level of intern personal agency also positively affected performance development; workplace constraints seemed to negatively affect performance development.

The findings support the influence of the selected characteristics of the cognitive apprenticeship model on the development of expertise, confirming the recommendations of many researchers (Brown et al., 1989; Collins, 1991). They also indicate that the cognitive apprenticeship instruction model needs some modification, that other factors need to be systematically taken into account. In addition, several implications emerged from the study for the design and administration of internships in educational technology.

Clearly, additional research is needed. An important first step would be to study the development of expertise among a greater number of interns in relation to characteristics of the cognitive apprenticeship model. Such studies could be designed to follow one expert across several interns, preferably of various skill levels, from novice to expert, which would provide a broader view of the influences of specific instructional methods. Researchers also need to investigate each individual method of instruction and employ a variety of observational strategies, including the analysis of verbal and video protocols, which would provide a better understanding of how modeling, coaching, and articulation influence the development of expertise. Research in simulated environments characterized by cognitive apprenticeship would provide more information about the influences of this instructional model. Future studies should also include not only the immediate effects of the instructional methods on performance, but also the longer term retention and transferability of knowledge and skills to related areas of performance.

The limited design of this study constrains the findings to my interpretations of two interns' experiences. However, the findings can "enable someone interested in making a transfer to his or her own situation to reach a conclusion about whether transfer can be contemplated as a possibility" (Lincoln & Guba, 1985, p. 316). Also, the similarity or difference between the

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mentors' and interns' genders was not addressed as a central issue. Further research is needed to determine any significant influence that this factor might have.

Needless to say, many questions remain to be answered. However, I truly believe that this study's findings contribute to a better understanding of how an intern develops expertise through modeling, coaching, scaffolding, fading, and articulation. As one intern, Dawn, noted in her final paper, "It takes two to Tango." This study hopefully will help perfect the "dance" in an internship setting.

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